FUZZY COMPREHENSIVE EVALUATION ON FUNCTIONS OF JIUGONGSHAN NATURE RESERVE

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Abstract: Functional evaluation is an effective method for natural reserves in order to improve management and archive their functions. In this paper, using the theory of fuzzy logic and questionnaire surveys, a hierarchical criterion system with three layers and twenty factors was established for fuzzy comprehensive evaluation of functions in the Jiugongshan Nature Reserve. It was shown that the function of this reserve as a whole was in good situation, with the nature conservation and social development also in a good status, but the sub-functions of others were just so-so. In order to improve functions of the reserve, we should improve the protection of resources and landscapes, set up new propaganda and education agenda. Overall, five suggestions were proposed to strengthen the function of this reserve.

Key words: indicator system; fuzzy comprehensive evaluation; Jiugongshan Nature Reserve; neighborhood grade; questionnaire surveys

太湖梅梁湾微囊藻毒素归宿研究取得新进展

淡水水体蓝藻水华及其毒素持续、大范围的发生严重干扰了水生态系统功能，对人类健康造成直接和间接的危害。我国经济建设的快速发展加剧了水体富营养化进程，致使许多饮用水源水体中发生大规模的蓝藻水华，成为水质量安全的重大隐患之一。近期太湖蓝藻水华爆发导致无锡市公共饮用水危机就是一个例证。有毒蓝藻水华毒素的环境归宿过程及其在水体中的主要自然消亡途径是近年来国际研究的热点之一。只有认识蓝藻毒素的环境归宿过程才能更好地评价其造成的环境风险，进而制定相应的消除或减低风险的规避策略。

近年来，中国科学院水生生物研究所宋立荣研究员领导的研究小组在太湖及滇池围绕该问题开展了系列研究，即将发表在水资源领域核心刊物《Water Research》上的“Distribution and bioaccumulation of microcystins in water columns: A systematic investigation into the environmental fate and the risks associated with microcystins in Meiliang Bay, Lake Taihu”是该系列研究的论文之一。该论文详细报道了蓝藻及毒素在水柱中的分布规律，包括溶解态毒素和细胞结合态毒素的分布、毒素在水柱和底泥界面的分配及毒素在水生植物及水生动物体内的累积等。发现底泥界面是蓝藻毒素在水环境中的主要归宿地，而此前国际上普遍认为蓝藻毒素的归宿过程仅发生在水柱中。在此基础上评价了太湖梅梁湾水域作为饮用水源、水产品养殖等生态服务功能存在的潜在风险性。具体结论是：①太湖蓝藻水华中颗粒态微囊藻毒素含量和种类随季节发生剧烈变化，主要原因是微囊藻群体类型的快速转变；②水华季节梅梁湾中溶解态微囊藻毒素的含量已明显高于对人类健康构成威胁的控制剂量，表明梅梁湾已不适合作为水源地；③梅梁湾水域生产的鱼类等水产品已遭受微囊藻毒素污染，长期大量食用该湖湾中的水产品可能引起潜在健康隐患。为此，建议：加强蓝藻水华及其毒素的监测力度，及时向水质管理部门提供蓝藻水华与毒素污染预警预报信息，以确保人们远离蓝藻毒素侵害；加强淡水产品食品安全性领域的调查研究，并制定相关安全控制规范以降低毒素污染对人们健康的危害；加强污染治理和水生态修复工作，以控制日益严重的蓝藻水华污染。

中国科学院水生生物研究所宋立荣等 供稿